Decay Of Quantum Coherences Under The Influence Of A

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Photosynthesis in Algae: Biochemical and Physiological Mechanisms - Anthony W.D. Larkum 2020-06-03
Algae, including cyanobacteria, are in the spotlight today for a number of reasons; firstly it has become abundantly clear over recent years that algae have been neglected in terms of basic research and that knowledge gap is being rapidly closed with the establishment of some surprising discoveries, such as the presence of Near-Infra-Red-Absorbing cyanobacteria and a wealth of natural products; secondly molecular approaches have provided a wealth of approaches to genetically modify algae and produce value-added products; thirdly it has become clear just how important, marine phytoplankton is to global carbon capture and the production of food globally; and fourthly, it has also become clear that algae present unparalleled opportunities to generate biofuels in a sustainable and non-polluting way. This volume presents 15 chapters by world experts on their subjects, ranging from reviews of algal diversity and genetics to in-depth reviews of special algal groups such as diatoms (which account for over 30% of marine carbon capture). Other chapters chart the ways in which this carbon capture occurs or how there are a multiplicity of ways in which algae intercept sun light and deploy this energy for carbon capture. A fascinating aspect here is the way in which sun light is harvested. A special chapter is devoted to the very recent and exciting possibility that algae use coherent light energy transformation to enhance the efficiency of light capture, an aspect of quantum physics that has implications for future developments at several levels and a variety of industries. Just how and why algae use Chlorophyll a as the major light capture pigment is discussed in several chapters. However, attention is also given to those cyanobacteria, which have been found to use the special Near-Infra Red absorbing chlorophylls mentioned above. And attention is also given to those algae that employ phycobiliproteins to fill in the “green window”, i.e., the spectral region from 400 – 650 nm, which is not efficiently covered by chlorophyll and carotenoid pigments. Photoinhibition and photoprotection is the subject area of several chapters and one which it is essential to understand a we work towards greater efficiency of algal photosynthesis. A final chapter is devoted to understanding the molecular basis for coral bleaching, a much-neglected area that is essential in trying to come up with solutions to this very worrying phenomenon, caused by global warming and ocean acidification. This is a book for research scientists, environmentalists, planners in a range of areas including those of marine resources, nutrient control and pollution of water bodies and that growing body of concerned citizens interested in controlling carbon emissions and global warming. Special attention has been given to generating a set of articles that will be read by university students, informed laymen and all those whose wish to understand the rapid changes that have come about in our knowledge of algae over the past decade.
Condensed Matter Field Theory - Alexander Altland 2010-03-11
Modern experimental developments in condensed matter and ultracold atom physics present formidable challenges to theorists. This book provides a pedagogical introduction to quantum field theory in many-particle physics, emphasizing the applicability of the formalism to concrete problems. This second edition contains two new chapters developing path integral approaches to classical and quantum nonequilibrium phenomena. Other chapters cover a range of topics, from the introduction of many-body techniques and functional integration, to renormalization group methods, the theory of response functions, and topology. Conceptual aspects and formal methodology are emphasized, but the discussion focuses on practical experimental applications drawn largely from condensed matter physics and neighboring fields. Extended and challenging problems with fully worked solutions provide a bridge between formal manipulations and research-oriented thinking. Aimed at elevating graduate students to a level where they can engage in independent research, this book complements graduate level courses on many-particle theory.
Quantum Dissipative Systems - Ulrich Weiss 2012-03-05
Starting from first principles, this book introduces the fundamental concepts and methods of dissipative quantum mechanics and explores related phenomena in condensed matter systems. Major experimental achievements in cooperation with theoretical advances have brightened the field and brought it to the attention of the general community in natural sciences. Nowadays, working knowledge of dissipative quantum mechanics is an essential tool for many physicists. This book — originally published in 1990 and republished in 1999 and and 2008 as enlarged second and third editions — delves significantly deeper than ever before into the fundamental concepts, methods and applications of quantum dissipative systems. This fourth edition provides a self-contained and updated account of the quantum mechanics of open systems and offers important new material including the most recent developments. The subject matter has been expanded by about fifteen percent. Many chapters have been completely rewritten to better cater to both the needs of newcomers to the field and the requests of the advanced readership. Two chapters have been added that account for recent progress in the field. This book should be accessible to all graduate students in physics. Researchers will find this a rich and stimulating source. Contents:IntroductionGeneral Theory of Open Quantum Systems:Diverse Limited Approaches: A Brief SurveySystem-Plus-Reservoir ModelsImaginary-Time Approach and Equilibrium DynamicsReal-Time Path Integrals and Nonequilibrium DynamicsMiscellaneous Applications:Damped Linear Quantum Mechanical OscillatorQuantum Brownian Free MotionThe Thermodynamic Variational ApproachSuppression of Quantum CoherenceQuantum Statistical Decay:IntroductionClassical Rate Theory: A Brief OverviewQuantum Rate Theory: Basic Methods Multidimensional Quantum Rate TheoryCrossover From Thermal to Quantum DecayThermally Activated DecayThe Crossover RegionDissipative Quantum TunnelingThe Dissipative Two-State System:IntroductionThermodynamicsElectron Transfer and Incoherent TunnelingTwo-State Dynamics: Basics and MethodsTwo-State Dynamics: Sundry TopicsThe Driven Two-State SystemThe Dissipative Multi-State System:Quantum Brownian Particle in a Washboard PotentialMulti-State DynamicsDuality SymmetryTwisted Partition Function and Nonlinear MobilityCharge Transport in Quantum Impurity SystemsQuantum Transport for Sub- and Super-Ohmic Friction Readership: Advanced undergraduate and graduate students; researchers in quantum statistical and condensed matter physics, in quantum/classical mechanics, in quantum information and quantum state engineering, in quantum optics, and in Bose-condensed systems. Keywords:Quantum System;Quantum Tunneling;Quantum Mechanics;Thermodynamics
Nuclear Spin Relaxation in Liquids - Jozef Kowalewski 2017-12-14
Nuclear magnetic resonance (NMR) is widely used across many fields of science because of the rich data it produces, and some of the most valuable data come from studies of nuclear spin relaxation in solution. The first edition of this book, published more than a decade ago, provided an accessible and cohesive treatment of the field. The present second edition is a significant update, covering important new developments in recent years. Collecting relaxation theory, experimental techniques, and illustrative applications into a single volume, this book clarifies the nature of the phenomenon, shows how to study it and explains why such studies are worthwhile. Coverage ranges from basic to rigorous theory and from simple to sophisticated experimental methods. Topics include cross-relaxation, multispin phenomena, relaxation studies

of molecular dynamics and structure and special topics such as relaxation in systems with quadrupolar nuclei, in paramagnetic systems and in long-living spin states. Avoiding overly demanding mathematics, the authors explain spin relaxation in a manner that anyone with a familiarity with NMR can follow. The focus is on illustrating and explaining the physical nature of relaxation phenomena. Nuclear Spin Relaxation in Liquids: Theory, Experiments and Applications, 2nd edition, provides useful supplementary reading for graduate students and is a valuable reference for NMR spectroscopists, whether in chemistry, physics or biochemistry.

Computational Mind: A Complex Dynamics Perspective - Vladimir G. Ivancevic 2007-06-12

This is a graduate–level monographic textbook in the field of Computational Intelligence. It presents a modern dynamical theory of the computational mind, combining cognitive psychology, artificial and computational intelligence, and chaos theory with quantum consciousness and computation. The book introduces to human and computational mind, comparing and contrasting main themes of cognitive psychology, artificial and computational intelligence.

Manipulating Quantum Coherence in Solid State Systems - Michael E. Flatté 2007-05-30

This book features the proceedings of the NATO Advanced Study Institute "Manipulating Quantum Coherence in Solid State Systems", held in Cluj-Napoca, Romania, August 2005, which presented a fundamental introduction to solid-state approaches to achieving quantum computation. This proceedings volume describes the properties of quantum coherence in semiconductor spin-based systems and the behavior of quantum coherence in superconducting systems.

The Quantum Matrix - Gershon Kurizki 2020-04-15

In this book, Henry Bar, physicist and the first quantum superhero, guides the reader through the amazing quantum world. His hair-raising adventures in his perilous struggle for quantum coherence are graphically depicted by comics and thoroughly explained to the lay reader. Behind each adventure lies a key concept in quantum physics. These concepts range from the basic quantum coherence and entanglement through tunnelling and the recently discovered quantum decoherence control, to the principles of the emerging technologies of quantum communication and computing. The explanations of the concepts are accessible, but nonetheless rigorous and detailed. They are followed by an account of the broader context of these concepts, their historic perspective, current status and forthcoming developments. Finally, thought-provoking philosophical and cultural implications of these concepts are discussed. The mathematical appendices of all chapters cover in a straightforward manner the core aspects of quantum physics at the level of a university introductory course. The Quantum Matrix presents an entertaining, popular, yet comprehensive picture of quantum physics . It can be read as a light-hearted illustrated tale, a philosophical treatise, or a textbook. Either way, the book lets the reader delve deeply into the wondrous quantum world from diverse perspectives and obtain glimpses into the quantum technologies that are about to reshape our lives. This book offers the reader an enjoyable and rewarding voyage through the quantum world.

Encyclopedia of Optical Engineering: Pho-Z, pages 2049-3050 - Ronald G. Driggers 2003

Compiled by 330 of the most widely respected names in the electro-optical sciences, the Encyclopedia is destined to serve as the premiere guide in the field with nearly 2000 figures, 560 photographs, 260 tables, and 3800 equations. From astronomy to x-ray optics, this reference contains more than 230 vivid entries examining the most intriguing technological advances and perspectives from distinguished professionals around the globe. The contributors have selected topics of utmost importance in areas including digital image enhancement, biological modeling, biomedical spectroscopy, and ocean optics, providing thorough coverage of recent applications in this continually expanding field.

Nonequilibrium Statistical Physics - Gerd Röpke 2013-03-14

Authored by a well-known expert in the field of nonequilibrium statistical physics, this book is a coherent presentation of the subject suitable for masters and PhD students, as well as postdocs in physics and related disciplines. Starting from a general discussion of irreversibility and entropy, the method of nonequilibrium statistical operator is presented as a general concept. Stochastic processes are introduced as a necessary prerequisite to describe the evolution of a nonequilibrium state. Different standard approaches such as master equations, kinetic equations and linear response theory, are derived after special assumptions. This allows for an insight into the problems of nonequilibrium physics, a discussion of the limits of the approaches, and suggestions for improvements. The method of thermodynamic Green's function is outlined that allows for the systematic quantum statistical treatment of many-body systems. Applications and typical examples are given, as well as fully worked problems.

Coherence and Quantum Optics VI - J.H. Eberly 1989

The sixth Rochester Conference on Coherence and Quantum Optics was held at the Campus of the University of Rochester during the three-day period June 26-28, 1989. This Conference was a sequel to five earlier meetings in this series, held in 1960, 1966, 1972, 1977 and 1983. The latest meeting was by far the largest. There were 327 registrants from 26 different countries. Altogether 252 papers were presented in 45 sessions. There were also 22 poster papers. This volume contains an abbreviated version of most of the papers presented at the meeting. The Conference was organized by a Program Committee consisting of the following: F.T. Arecchi (Istit. Naz. d'Ott., Firenze) N. Bloembergen (Harvard U.) C. Cohen-Tannoudji (Ecole Normale Superieure) H. Haken (U. Stuttgart) S. Haroche (Yale and Ecole Normale Supeneure) A.L. Schawlow (Stanford U.) C.R. Stroud, Jr. (U. of Rochester) D.F. Walls (U. of Auckland) H. Walther (Max-Planck-Inst. and U. MUnchen) J.H. EberlY] L. Mandel Joint Secretaries (U. of Rochester) E. Wolf v The Conference was sponsored by the Air Force Office of Scientific Research, by the Optical Society of America, by the American Physical Society and by the University of Rochester. We wish to use this opportunity to thank all of the sponsors for their support.

Macroscopic Matter Wave Interferometry - Stefan Nimmrichter 2014-06-10

Matter-wave interferometry is a promising and successful way to explore truly macroscopic quantum phenomena and probe the validity of quantum theory at the borderline to the classic world. Indeed, we may soon witness quantum superpositions with nano to micrometer-sized objects. Yet, venturing deeper into the macroscopic domain is not only an experimental but also a theoretical endeavour: new interferometers must be conceived, sources of noise and decoherence identified, size effects understood and possible modifications of the theory taken into account. This thesis provides the theoretical background to recent advances in molecule and nanoparticle interferometry. In addition, it contains a physical and objective method to assess the degree of macroscopicity of such experiments, ranking them among other macroscopic quantum superposition phenomena.

Official Gazette of the United States Patent and Trademark Office - 1992

Quantum Communications and Measurement - V.P. Belavkin 2013-06-29

The International Workshop on Quantum Communications and Measurement was held at the University of Nottingham from July 10-16, 1994. It followed the successful meeting on Quantum Aspects of Optical Communications in Paris in November 1990. This time the conference was devoted to mathematical, physical and engineering aspects of quantum noise, signal processing and quantum informa tion in open systems, quantum channels, and optical communications. It brought research workers in the experimental and engineering aspects of quantum optics and communication systems into contact with theoreticians working in quantum probability and measurement theory. The workshop was attended by more than 130 participants from 22 different countries. The largest groups [after the UK (31)] were from Japan (19) and from Russia (14). The subjects discussed included the mathematical foundations of quantum communication systems, experiments and devices, the problem of collapse and continuous measurement, quantum input and output processes, causality and nondemolition observation, squeezed states, quan tum jumps, state diffusion and spontaneous localization, filtering and control in quantum systems, and new quantum optical phenomena and effects, including non classical light. These new mathematical and physical ideas were stimulated by recent advances in generation and detection of light with low quantum noise and the development of techniques for trapping a single atom over an extended period of time, making it possible to observe individual quantum phenomena at the macroscopic level.

Quantum Coherence - Walter Pötz 2006-02-21

Quantum coherence plays a crucial role in various forms of matter. The thriving field of quantum information as well as unconventional approaches to using mesoscopic systems in future optoelectronic devices provide the exciting background for this set of lectures. The lectures

originate from the Schladming Winter Schools and are edited to address a broad readership ranging from the graduate student up to the senior scientist.

KP effect -

Two clumps of matter pass through each other without sharing space; In some cases the colliding clumps of matter appear to deepen their distance even as they pass through each other. Clumps of a few hundred thousand lithium atoms that are cooled to within one-millionth of a degree above absolute zero a temperature so cold that the atoms march in lockstep and act as a single matter wave. The Interaction of light with matter has long been a field of interest for many quantum physicists, however, limited to the field of interaction plus the form of interaction. I've found it to be much better to look at not as a phenomenon but as something of a paradox, whether the audience find it tangible or not, this might probably be the best starting point if one wish to have million ways to see quantum theory in its entirety.

Quantum Coherence - Jeeva S Anandan 1991-03-30

The foundations of quantum mechanics has acquired tremendous importance in recent years for three reasons: First, a large number of experiments have tested concepts which previously were purely theoretical. Second, ideas from the foundations of quantum mechanics are being applied now to many fields such as condensed matter physics, quantum statistics, quantum cosmology and quantum gravity. Third, difficulties in constructing a quantum cosmology and theory of gravity have made many theorists examine the foundations of quantum theory to see if quantum mechanics itself needs to be modified. Very distinguished physicists from around the world gave talks on their recent research on a variety of theoretical and experimental aspects on these subjects at this conference. Contents: The Berry Phase as an Appropriate Correspondence Limit of the Aharonov-Anandan Phase in a Simple Model (J Christian & A Shimony)On the Nature of the Transition in Quantum Field Theory from Flat to Curved Space-Time (P J Camp & J L Safko)The Aharonov-Bohm Effect without Gauge Fields – A Paradox (I Klebanov & L Susskind)Geometrical and Topological (AN)Holonomies in Optical Experiments (R Y Chiao)Some Global Problems in Gauge Theories (F Wilczek)Experimental Verification of the Aharonov-Casher Effect for Neutrons with a Crystal Interferometer (G I Opat et al.)Fundamental Aspects of Quantum Theory Related to the Problem of Quantizing Black Holes (G ' t Hooft)A Suggested New Translation Gauge Invariance for Space-time (D Bohm)Spin and the Aharonov-Bohm Effect (C R Hagen)The Aharonov-Bohm Effect in Small Resistive Devices (R A Webb)Wave Geometry: A Plurality of Singularities (M V Berry)Analogue of the Aharonov-Bohm Effect for Black Holes and Strings (S B Giddings)Closing in on a Renormalizable and Unitary Point-Local Quantum Field Theory of Gravity (Y Ne ' eman & C-Y Lee)Gravitational Chern-Simons Term, Anyons and AB (S Deser)Experimental Confirmation of the Aharonov-Bohm Effect by Electron Holography (A Tonomura)A Geometric View of Quantum Mechanics (J Anandan)Towards a Two Vector Formulation of Quantum Mechanics (Y Aharonov & D Rohrlich)Musings on Quantum Statistics (A Zee)Topology, Quantum Theory and Dynamics (E C G Sudarshan)and other papers Readership: Experimental and theoretical physicists. keywords:

Advances in Magnetic and Optical Resonance - Warren S. Warren 2013-10-22

Advances in Magnetic and Optical Resonance, Volume 17 reviews different developing branches of coherent spectroscopy, focusing on the incoherent radiation pulses in optics and magnetic resonance. This book is divided into two chapters. Chapter 1 summarizes the uses and occasional advantages of incoherent radiation pulses in optics and magnetic resonance. The second chapter reviews theoretical developments in zero-field NMR and ESR spectroscopies. Other topics include the nonlinear incoherent spectroscopy; stochastic nonlinear susceptibilities; nonlinear interferometer for magnetic resonance; and nonlinear interference and optics. The zero-field spin dynamics and relaxation and ZF line shapes in the presence of molecular reorientations are also covered. This publication is a good reference for students and researchers interested in coherent spectroscopy.

High-Dimensional Chaotic and Attractor Systems - Vladimir G. Ivancevic 2007-02-06

This graduate–level textbook is devoted to understanding, prediction and control of high–dimensional chaotic and attractor systems of real life. The objective is to provide the serious reader with a serious scientific tool that will enable the actual performance of competitive research in high–dimensional chaotic and attractor dynamics. From introductory material on low-dimensional attractors and chaos, the text explores concepts including Poincaré's 3-body problem, high-tech Josephson junctions, and more.

Femtochemistry: Ultrafast Dynamics of the Chemical Bond - Ahmed H Zewail 1994-09-12

0Keywords: "This two-volume set provides an excellent source of information on the state of the art in femtosecond spectroscopy. It is an invaluable reference for experts in the field as well as those interested in mastering the experimental and theoretical aspects of ultrafast time-resolved spectroscopy." J Am Chem Soc.

Solid-State NMR IV Methods and Applications of Solid-State NMR - B. Blümich 2012-12-06

Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance at NMR meetings, approaching that ofliquid state resonance. Important progress can be observed in the areas of methodological developments and applications to organic and inorganic matter. One volume devoted to more or less one of each of these areas has been published in the preceding three issues. This volume can be considered an addendum to this series. Selected methods and applications of Solid-State NMR are featured in three chapters. The first one treats the recoupling of dipolar interactions in solids, which are averaged by fast sample rotation. Following an introduction to effective Hamiltonians and Floquet theory, different types of experiment such as rotary resonance, dipolar chemical shift correlation spectroscopy, rotational resonance and multipulse recoupling are treated in the powerful Floquet formalism. In the second chapter, the different approaches to line narrowing of quadrupolar nuclei are reviewed in a. consistent formulation of double resonance (DaR) and dynamic angle spinning (DAS). Practical aspects of probe design are considered as well as advanced 2D experiments, sensitivity enhancement techniques, and spinning sideband manipulations. The use of such techniques dramatically increases the number of nuclei which can be probed in high resolution NMR spectroscopy. The final chapter describes new experimental approaches and results of structural studies of noncrystalline solids.

Quantum Dissipative Systems - Ulrich Weiss 2008

Major advances in the quantum theory of macroscopic systems, in combination with experimental achievements, have brightened the field and brought it to the attention of the general community in natural sciences. This edition delves deeper into the fundamental concepts, methods, and applications of quantum dissipative systems.

Optics as a Key to High Technology - International Commission for Optics. Congress 1993

Quantum Dissipative Systems - Ulrich Weiss 2008

Major advances in the quantum theory of macroscopic systems, in combination with experimental achievements, have brightened the field and brought it to the attention of the general community in natural sciences. This edition delves deeper into the fundamental concepts, methods, and applications of quantum dissipative systems.

Microscopic Aspects of Nonlinearity in Condensed Matter - Alan R. Bishop 2012-12-06

Proceedings of a NATO ARW held in Florence, Italy, June 7--13, 1990

Quantum Signatures of Chaos - Fritz Haake 2019-02-18

This classic text provides an excellent introduction to a new and rapidly developing field of research. Now well established as a textbook in this rapidly developing field of research, the new edition is much enlarged and covers a host of new results.

Phase in Optics - Vlasta Pe?inov 1998

The history of the quantum phase problem, characterized by renewed interest in the solution to the problem, is included and brought up to date.

Coherence and Quantum Optics VIII - N.P. Bigelow 2012-12-06

The Eighth Rochester Conference on Coherence and Quantum Optics was held on the campus of the University of Rochester during the period June 13-16,2001. This volume contains the proceedings of the meeting. The meeting was preceded by an affiliated conference, the International Conference on Quantum Information, with some overlapping sessions on June 13. The proceedings of the affiliated conference will be published separately by the Optical Society of America. A few papers that were presented in common plenary sessions of the two conferences will be published in both proceedings volumes. More than 268 scientists from 28 countries participated in the week long discussions and presentations. This Conference differed from the previous seven in the CQO series in

several ways, the most important of which was the absence of Leonard Mandel. Professor Mandel died a few months before the conference. A special memorial symposium in his honor was held at the end of the conference. The presentations from that symposium are included in this proceedings volume. An innovation, that we believe made an important contribution to the conference, was the inclusion of a series of invited lectures chaired by CQO founder Emil Wolf, reviewing the history of the fields of coherence and quantum optics before about 1970. These were given by three prominent participants in the development of the field, C. Cohen-Tannoudji, 1. F. Clauser, and R. I. Glauber.

Progress in Optics - 1995-12-01

This volume presents a review of the research in several areas of modern optics written by experts well-known in the international scientific community. The first chapter discusses properties and methods of production and detection of coherent superpositions of macroscopically distinguishable states of light (the so-called Schrodinger cat states). Chapter two deals with the phase-shift method, which originated in the 1930s, for the analysis of potential-scattering problems in atomic and nuclear physics. Recently this approach has been applied to wave propagation in one-dimensional inhomogeneous media. Chapter three is concerned with the statistical properties of dynamic laser speckles that arise from scattering objects with rough surfaces undergoing translation and rotation. A moving phase-screen model is employed, which gives a relatively simple formulation of the theory and a clear picture of the time-varying speckle phenomenon. The fourth chapter presents a review of the more important theoretical and experimental results relating to optics of multilayer systems with randomly rough boundaries. The significant theoretical approaches which make it possible to interpret experimental data involving such systems are described, and relevant methods for optical characterization of systems of this kind are outlined. The last chapter presents an account of a theory of the photon transport through turbid media.

Quantum Coherence in Solid State Systems - Benoît Deveaud 2009

"This volume gives an overview of the manifestations of quantum coherence in different solid state systems, including semiconductor confined systems, magnetic systems, crystals and superconductors. Besides being of paramount importance in fundamental physics, the study of quantum coherence furnishes the starting point for important applications like quantum computing or secure data transmission. The coherent effects discussed mainly involve elementary excitations in solids like polaritons, excitons, magnons, macroscopic quantities like superconductor currents and electron spins. Also, several new aspects of the physics of quasi-particles are understood and discussed in this context. Due to the variety of systems in which quantum coherence may be observed, solid state systems are the natural candidates for applications that rely on coherence, for example quantum computer." -- Book Jacket.

Foundations of Quantum Mechanics in the Light of New Technology - S Nakajima 1997-01-03

”I re-experience once again the stimulating atmosphere of each of the ISQMs: There were theoretical discussions in diverse frontier areas of physics as well as descriptions of beautiful new (or planned) experiments and technologies. From each of the Symposia I always came away with the exciting feeling of how wonderful physics is and how lucky it is to be a physicist in this era.” Chen Ning Yang This volume is selected from the First through Fourth International Symposia on Foundations of Quantum Mechanics. The International Symposia on Foundations of Quantum Mechanics in the Light of New Technology (ISQMs) provide a unique interdisciplinary forum where distinguished theorists and experimentalists of diverse fields of research gather to discuss basic problems in quantum mechanics in the light of new technology. This volume collects 51 papers selected from over 200 papers by many distinguished scientists. It includes articles by C N Yang, J A Wheeler, Y Nambu, L Esaki and M P A Fisher, to name just a few, and contains topics ranging from quantum measurements to quantum cosmology. Contents:Proceedings of the First International Symposium (S Kamefuchi et al.):Gauge Fields, Electromagnetism and the Bohm–Aharonov Effect (C N Yang)Non-Local Phenomena and the Aharonov–Bohm Effect (Y Aharonov)Electron Holography, Aharonov–Bohm Effect and Flux Quantization (A Tonomura et al.)The Superposition Principle in Macroscopic Systems (A J Leggett)and other papersProceedings of the Second International Symposium (M Namiki et al.):Quantum Measurements in Neutron Interferometry (H Rauch)The Two-Photon Polarisation Correlation of Metastable Hydrogen as Test between Quantum Mechanics and Local Realistic Theories (H Kleinpoppen)Proof of the Aharonov–Bohm Effect with Completely Shielded Magnetic Field (A Tonomura et al.)Fractional Quantum Statistics in Two-Dimensional Systems (Y-S Wu)and other papersProceedings of the Third International Symposium (S Kobayashi et al.):Optical Manifestations of Berry's Topological Phases: Aharonov–Bohm-like Effects for the Photon (R Y Chiao)High Precision Determination of ??and Quantum Electrodynamics for Nonrelativistic Systems (T Kinoshita)Observations on Conductance Quantization and Dephasing in Mesoscale Systems (A Stern et al.)Quantum Ballistic Electron Transport and Conductance Quantization in a Constricted Two-Dimensional Electron Gas (B J van Wees)and other papersProceedings of the Fourth International Symposium (M Tsukada et al.):Reflections on the Development of Theoretical Physics (C N Yang)The Effect of Dissipation on Tunneling (A J Leggett)Quantum Diffusion in Metals (J Kondo)Tunneling Phenomena in Nuclear Physics (R A Broglia et al.)and other papers Readership: Scientists and engineers in optics, electronics, magnetics, device physics, condensed matter physics and applied physics in general. keywords:Quantum Mechanics;Aharonovâ□□Bohm Effect;Macroscopic Quantum Tunneling;Theory of Measurement;Delayed Choice Experiment;Neutron Interferometry;EPR Correlation;STM;Gauge Fields;Conductance Quantization;Mesoscopic Systems;Berry's Phase;Coherence;Interference;Neutron Interferometer;Aspect's Experiment;Bell's Inequality;Hidden Variable;EPR Paradox

Solid-State NMR - David C. Apperley 2012-06-10

The power of nuclear magnetic resonance, NMR, for characterizing molecules dissolved in solution is widely acknowledged and NMR forms an essential component of undergraduate chemistry degrees. However, the application of NMR to the solid state is much less well appreciated. This text sets out the fundamental principles of solid-state NMR, explaining how NMR in solids differs from that in solution, showing how the various interactions of NMR can be manipulated to yield high-resolution spectra and to give information on local structure and dynamics in solids. This book aims to take some of the mystique out of solid-state NMR by providing a comprehensible discussion of the methodology, including the basic concepts and a practical guide to implementation of the experiments. A basic knowledge of solution-state NMR is assumed and is only briefly covered. The text is intended for those in academia and industry expecting to use solid-state NMR in their research and looking for an accessible introduction to the field. It will also be valuable for non-experts interested in learning how NMR can be usefully applied to solid systems. Detailed mathematical treatments are delayed to a chapter at the mid-point of the text and can be skipped. Introductions to experiments and numerical simulations are provided to help link NMR results to experimental practice. The different aspects of solid-state NMR, from basic pulse-and-acquire experiments to sophisticated techniques for the measurement of anisotropy information are presented. Examples illustrate the wide variety of applications of the technique and its complementarity to other solid-state characterization techniques such as X-ray diffraction. Various aspects of NMR crystallography are covered as are topics of motion in solids.

Dissipative Quantum Mechanics of Nanostructures - Andrei D. Zaikin 2019-05-24

Continuing miniaturization of electronic devices, together with the quickly growing number of nanotechnological applications, demands a profound understanding of the underlying physics. Most of the fundamental problems of modern condensed matter physics involve various aspects of quantum transport and fluctuation phenomena at the nanoscale. In nanostructures, electrons are usually confined to a limited volume and interact with each other and lattice ions, simultaneously suffering multiple scattering events on impurities, barriers, surface imperfections, and other defects. Electron interaction with other degrees of freedom generally yields two major consequences, quantum dissipation and quantum decoherence. In other words, electrons can lose their energy and ability for quantum interference even at very low temperatures. These two different, but related, processes are at the heart of all quantum phenomena discussed in this book. This book presents copious details to facilitate the understanding of the basic physics behind a result and the learning to technically reproduce the result without delving into extra literature. The book subtly balances the description of theoretical methods and techniques and the display of the rich landscape of the physical phenomena that can be accessed by these methods. It is useful for a broad readership ranging from master’s and PhD students to postdocs and senior researchers.

Physics Briefs - 1993

Encyclopedia of Optical and Photonic Engineering (Print) - Five Volume Set - Craig Hoffman 2015-09-22

The first edition of the Encyclopedia of Optical and Photonic Engineering provided a valuable reference concerning devices or systems that generate, transmit, measure, or detect light, and to a lesser degree, the basic interaction of light and matter. This Second Edition not only reflects the changes in optical and photonic engineering that have occurred since the first edition was published, but also: Boasts a wealth of new material, expanding the encyclopedia’s length by 25 percent Contains extensive updates, with significant revisions made throughout the text Features contributions from engineers and scientists leading the fields of optics and photonics today With the addition of a second editor, the Encyclopedia of Optical and Photonic Engineering, Second Edition offers a balanced and up-to-date look at the fundamentals of a diverse portfolio of technologies and discoveries in areas ranging from x-ray optics to photon entanglement and beyond. This edition’s release corresponds nicely with the United Nations General Assembly’s declaration of 2015 as the International Year of Light, working in tandem to raise awareness about light’s important role in the modern world. Also Available Online This Taylor & Francis encyclopedia is also available through online subscription, offering a variety of extra benefits for researchers, students, and librarians, including: Citation tracking and alerts Active reference linking Saved searches and marked lists HTML and PDF format options Contact Taylor and Francis for more information or to inquire about subscription options and print/online combination packages. US: (Tel) 1.888.318.2367; (E-mail) e-reference@taylorandfrancis.com International: (Tel) +44 (0) 20 7017 6062; (E-mail) online.sales@tandf.co.uk

Femtochemistry - Ahmed H. Zewail 1994

Volume II continues with reaction rates, the concept of elementary intramolecular vibrational-energy redistribution (IVR) and the phenomena of rotational coherence which has become a powerful tool for the determination of molecular structure via time resolution. The second volume ends with an extensive list of references, according to topics, based on work by Professor Zewail and his group at Caltech. These collected works by Professor Zewail will certainly be indispensable to both experts and beginners in the field. The author is known for his clarity and for his creative and systematic contributions. These volumes will be of interest and should prove useful to chemists, biologists and physicists. As noted by Professor J. Manz (Berlin) and Professor A.W. Castleman, Jr.

Quantum Coherence, Correlation and Control in Finite Quantum Systems - Hui Yan 2022-10-21

Squeezed and Nonclassical Light - P. Tombesi 2013-11-11

The recent generation in the laboratory of phase squeezed and intensity squeezed light beams has brought to fruition the theoretical predictions of such non-classical phenomena which have been made and developed in recent years by a number of workers in the field of quantum optics. A vigorous development is now underway of both theory and experiment and the first measurements have been coi:Jfirmed and extended already in some half dozen laboratories. Although the fields of application of these novellight sources are as yet somewhat hazy in our minds and some inspired thinking is required along these lines, the pace and excitement of the research is very clear. It is to he hoped that the new possibilities of: making measurements below the quantum shot noise lirnit which is made possible by these squeezed states of light willlead to further fundamental advances in the near future. In this NATO ARW a number of the leaders in the field met in the extremely pleasant surroundings of Cortina d'Ampezzo and their contributions are recorded in this volume. The meeting was held at the Istituto d'Arte which was enjoying its lOOth anniversary celebrations. This ARW was preceeded by an ONR Special Seminar on "Photons and Quantum Fluctuations", the proceedings of which will be published by Adam Hilger Ltd. The timeliness of the meeting was acknowledged by the support of the NATO Scientific Affairs Division which we would like to acknowledge on behalf of all the participants.

Evolution of Size Effects in Chemical Dynamics - Ilya Prigogine 2009-09-08

The Advances in Chemical Physics series provides the chemical physics and physical chemistry fields with a forum for critical, authoritative evaluations of advances in every area of the discipline. Filled with cutting-edge research reported in a cohesive manner not found elsewhere in the literature, each volume of the Advances in Chemical Physics series serves as the perfect supplement to any advanced graduate class devoted to the study of chemical physics.

Macroscopic Quantum Coherence and Quantum Computing - Dmitri V. Averin 2012-12-06

This volume is an outgrowth of the Second International Workshop on Macroscopic Quantum Coherence and Computing held in Napoli, Italy, in June 2000. This workshop gathered a number of experts from the major Universities and Research Institutions of several countries. The choice of the location, which recognizes the role and the traditions of Naples in this field, guaranteed the participants a stimulating atmosphere. The aim of the workshop has been to report on the recent theoretical and experimental results on the macroscopic quantum coherence of macroscopic systems. Particular attention was devoted to Josephson devices. The correlation with other atomic and molecular systems, exhibiting a macroscopic quantum behaviour, was also discussed. The seminars provided both historical overview and recent theoretical ground on the topic, as well as information on new experimental results relative to the quantum computing area. The first workshop on this topic, held in Napoli in 1998, has been ennobled by important reports on observations of Macroscopic Quantum Coherence in mesoscopic systems. The current workshop proposed, among many stimulating results, the first observations of Macroscopic Quantum Coherence between macroscopically distinct fluxoid states in rf SQUIDs, 20 years after the Leggett's proposal to experimentally test the quantum behavior of macroscopic systems. Reports on observations of quantum behaviour in molecular and magnetic systems, small Josephson devices, quantum dots have also been particularly stimulating in view of the realization of several possible q-bits.

Quantum Optics - Miguel Orszag 2016-04-18

This new edition gives a unique and broad coverage of basic laser-related phenomena that allow graduate students, scientists and engineers to carry out research in quantum optics and laser physics. It covers quantization of the electromagnetic field, quantum theory of coherence, atom-field interaction models, resonance fluorescence, quantum theory of damping, laser theory using both the master equation and the Langevin theory, the correlated emission laser, input-output theory with applications to non-linear optics, quantum trajectories, quantum non-demolition measurements and generation of non-classical vibrational states of ions in a Paul trap. In this third edition, there is an enlarged chapter on trapped ions, as well as new sections on quantum computing and quantum bits with applications. There is also additional material included for quantum processing and entanglement. These topics are presented in a unified and didactic manner, each chapter is accompanied by specific problems and hints to solutions to deepen the knowledge.